



## ASSESSMENT OF DRUG INFORMATION SERVICES AND INFORMATION SEEKING BEHAVIOR AMONG HEALTHCARE PROFESSIONALS IN KADUNA STATE.

**GAIUS K. MATHEW & HADIZA U. MA`AJI**

Department of Clinical Pharmacy and Pharmacy Management,  
Faculty Of Pharmaceutical Sciences, Kaduna State University

TETFund Centre of Excellence for Renewable Energy, Kaduna Polytechnic, Kaduna, Nigeria

© NJRER is the official Journal of the TETFund Centre of Excellence for Renewable Energy, Kaduna, Nigeria

<https://doi.org/10.5281/zenodo.17929412>

[https://njrer.org/download/assessment\\_of\\_drug\\_information\\_services.pdf](https://njrer.org/download/assessment_of_drug_information_services.pdf)

\*Corresponding author's details: [gaiusmatt@gmail.com](mailto:gaiusmatt@gmail.com)

### ARTICLE INFORMATION

#### Article history:

Received 15 Jan., 2025

Revised 20 Jun., 2025

Accepted 18 Oct., 2025

Available online 30 Nov., 2025

#### Keywords:

Drug Information, Pharmacists,  
Access, Behavior, Healthcare  
Kaduna State

### ABSTRACT

*Drug information service is a specialized service provided by pharmacists to enhance drug knowledge, rational prescribing and reduce medication errors. While information seeking behavior encompasses the information needs and sources consulted to obtain drug information. The study is aimed at assessing drug information services (DIS) and information seeking behavior among healthcare professionals (HCPs), carried out at Barau Dikko Teaching Hospital and Ahmadu Bello University Teaching Hospital, Kaduna State. It adopted a cross-sectional descriptive research study, and convenience sampling technique was used for this study. The study population was 345 healthcare professionals (Doctors, Pharmacists and Nurses) in both selected tertiary hospitals, from which a sample of 208 was drawn. Paper-based and online questionnaire were used. The questionnaires were divided into two sections, with a section for Pharmacists alone, while the other section was for both Doctors and Nurses. Out of 208 questionnaires administered, 190 were retrieved for analysis. Data was analyzed using frequencies and percentages. The findings of the study for Pharmacists showed that patients (32%) maximally utilized the drug information services. It was agreed that Pharmacists provided a satisfactory (51%) drug information, with most queries being on drug availability and cost (65%), adverse drug effects (62%) and drug indication (54%). The common drug information sources consulted by pharmacists was Emdex/Micromedex (80%). In respect to the results on the seeking behavior of other healthcare professionals (HCPs), most HCPs commonly rely on google (57%) and Pharmacists (41%) for their drug information. Furthermore, this study revealed that drug side effects (76%) and indication (72%) are the common drug information requirement by other HCPs. Finally, most HCPs complain of lack of time (48%) and unreliable information on the internet (48%) as a barrier towards seeking drug information. The Drug information services provided by the pharmacists were satisfactory and useful by providing unbiased and reliable drug information. Information needs are prompted by the desire to provide good and accurate healthcare services, revealing that most HCPs had drug information needs. Pharmacists and the internet appeared to be the most accessible options to seek their drug information.*

## **1. INTRODUCTION**

Drug information service is a specialized service provided by pharmacists to enhance drug knowledge, rational prescribing, and reduce medication errors (Abdullah et al., 2017). This service is targeted at providing response to the queries sought by health care professionals in solving drug-related problems associated to pharmacotherapy and patient management. One of the most important features of drug information is to be unbiased in its contents. Therefore, the unbiased nature of drug information is of importance to improve patient outcomes and lower adverse drug reactions (ADRs) (Shah et al., 2016). Drug information service encompasses the activities of specially trained individuals to provide accurate, unbiased information, primarily in response to patient-oriented drug problems received from various health-care professionals (Subash et al., 2013). These activities are carried out by trained individuals such as clinical pharmacist and doctor of pharmacy professionals who are qualified, registered and are saddled with the responsibility of providing information to optimize the drug therapy (Mudigubba et al., 2013).

Proper drug information seeking behavior helps to answer clinical questions to enhance patient care by reducing medication errors. All health-care professionals are faced with drug information needs related to the treatment of their patients. There are different ways in which health-care professionals can acquire drug information, which could either be printed or electronic resources to meet their drug information needs. However, with the introduction of electronic source/internet in 1990s, health-care professionals began using the Internet and medical databases to seek drug information (Iyer et al., 2011). Upgrade in technology in the later decade resulted to the use of hand held devices by health professionals to access medical and drug information. These devices such as, tablets and smart phones, as they felt that the use of these devices has reduced medication errors and has improved their clinical decision-making (Rothschild et al., 2002). Seeking proper drug information at the time of need increases health care professional's clinical knowledge, which is a crucial activity in health care delivery services, as this information keeps them updated on the latest medications available for patient treatment and care. "Seeking drug information is important in addressing drug related problems, which is an essential step that begins with identifying the question, to finding the appropriate answers" through the use of various sources which are available (Iyer et al., 2011). Pharmaceutical related knowledge is continuously growing, which has led to a variety of medications for healthcare professionals to use for patient care purposes. Therefore, understanding the knowledge about drug information-seeking behaviors, the best preferred resources and methods of acquiring drug-related information is necessary among different health care professionals, to facilitate access to drug information. Moreover, due to drug information overload and time limitations in seeking drug information, keeping and organizing information are necessary for healthcare professionals to easily access drug information when required in the future.

### **1.2 Statement of Research Problem**

Despite drug information services (DIS) being an effective tool for a better patient care within and outside the hospital setting, many healthcare providers possess inadequate access to both new and existing drug information knowledge to assist them in providing essential health care services (Subash *et al* 2013). Many health professionals rely on observations, internet, advice from colleagues and building experience empirically through their own treatment success and failures (Langat Milton et al., 2016). Consequently, Mohamed (2011) reported that many deaths could have been avoided if health professionals had access to appropriate and reliable health information updates in health care. Therefore, it is necessary to conduct studies frequently to access and analyze the utilization of drug information services, as well as information seeking behavior among other healthcare professionals in the hospital.

### **1.3 Justification of Study**

Drug use is a complex practice, even a small mistake and incomplete information has negative implication in patients, which can result into noncompliance, therapeutic failure, over dosage, medication errors, drug interactions and adverse drug reactions (ADRs). This consequently lead to ineffective and irrational use of drugs (Peter et al., 2017). Therefore, there is an urgent need for an increased drug information services and proper seeking behavior of drug information by healthcare professionals in Kaduna State to combat any patient therapy problems.

### **1.4 Aim of the Study**

The aim of this study is to assess drug information services, and information seeking behavior among Healthcare professionals in Kaduna State.

### **1.5 Objectives of Study**

- i. To evaluate the quality of drug information services provided among healthcare professionals.
- ii. To assess the drug information seeking behavior among health care professionals.
  
- iii. To determine the barriers of seeking drug information

### **1.6 Research Question**

- i. What is the level of quality of drug information service provided among healthcare professionals?
- ii. What is the level of behavior among healthcare professionals seeking drug information?
- iii. What are the barriers of seeking drug information?

## **2. LITERATURE REVIEW**

Drug Information is essential to preventing medication errors. Such information helps towards providing optimum patient care and improve patient outcome. Drug information obtained from commercial sources are often biased, and thus; non-commercial, independent, unbiased source of drug information is to be considered as reliable drug information source. The Drug Information Centre provides accurate, unbiased and reliable drug information to healthcare professionals and patients, provide counselling as well as monitor, identify and document adverse drug reactions (Malone, et al., 2006).

Drug Information can be seen as a written and / or verbal information or advice regarding drugs and drug therapy in response to a request from other healthcare providers, organizations, patients or the general public community. Drug Information Service (DIS) describes activities undertaken by pharmacists in providing reliable drug information to optimize drug use (Kalra et al., 2011).

Quality assurance in drug information services (DIS) ensures the services to be provided, providing them, determining how well the services were provided, and if the services were acceptable, noting some correctional activity to ensure that future services will be acceptable and optimal. In developing countries such as Nigeria, there are few drug information centers (DICs) and are limited by lack of sufficient personnel, revenue and by limited access to current literature. This shows the need for frequent evaluation of the functioning and quality of services provided by the DIC. Therefore, healthcare professionals are saddled with keeping up to date drug information with an increasing number of new drugs and literature.

### **2.3 History of Drug Information Center**

In 1962, the first drug information center was developed at the University of Kentucky Medical Center (Anand, et al., 2012). In India, Rosemary sharp, a missionary from UK, began the first drug

information center at Christian Medical College, Vellore in the early 1970s (Nahla, et al., 2016). Later the Karnataka State Pharmacy Council (KSPC) established its Drug Information Centre in August 1997 to disseminate unbiased and reliable drug information to healthcare professionals.

## **2.4 Drug Information Activities**

To be an effective provider of drug information (DI), the pharmacist must exercise excellent oral and written communication skills and must be able to;

- i. Identify and evaluate the DI needs of patients and health care professionals.
- ii. Obtain appropriate and complete background information.
- iii. Use a systematic approach to address DI needs by effectively searching, retrieving, and critically evaluating the literature (i.e., assessment of study design, statistics, bias, limitations, applicability).
- iv. Appropriately identify, communicate, document, and apply the information to the patient care situation (Mishra P, et al., 2008).

A variety of DI activities may be performed by pharmacists, depending on the particular practice setting and need. Every pharmacist should have the skills to perform the following DI activities:

- i. Providing DI to patients, caregivers, and health care professionals.
- ii. Creating and maintaining currency of a variety of print and online educational resources for patients (e.g., tip sheets, pamphlets) and health care professionals (e.g., in-service documents, newsletters) on topics such as optimal medication use, general health, or select clinical questions.
- iii. Educating health care professionals on safe and effective medication-use policies and processes, including development of resources to communicate this information.
- iv. Leading or participating in continuing education services for health care professionals.
- v. Educating pharmacy students and residents.
- vi. Participating in quality improvement research projects and drug cost analyses.
- vii. Contributing to the biomedical literature and providing peer review for other contributors. (Mishra P, et al., 2008).

## **2.5 Quality of Drug Information**

Seeking drug information is necessary to every clinician activity in the health care settings. Seeking this information is essential for drug problem-solving and is a necessary step in the process that starts with identifying the question, to finding the appropriate answer. Most drug information needs are related to drug therapy, which is required for patients and their diagnosis. Averagely, physicians and nurses had two informational needs for every three patients seen related to either treatment or diagnosis. Seeking drug information appropriately to answer these questions related to treatment or diagnosis important to enhance patient care by limiting drug related problems. Seeking drug information is necessary to keep health care professionals updated on the new happenings concerning drugs. Furthermore, it helps health care professionals in providing accurate diagnosis, following up on patient treatments as well as improving their clinical knowledge.

Health care professionals obtain drug information from a variety of drug information sources. These sources can be classified as commercial sources, which include drug company representatives, drug advertisement. While the non-commercial sources, include text books, medical letters, journal articles, professional meetings, clinical pharmacists, and colleagues. They could also be classified as written sources, which include books, journals, medical letters, drug company advertisements and oral sources; which include professional meetings, hospital pharmacists, and colleagues.

Generally, Sources of information can be classified as:

### **Primary literature:**

They are the foundation on which all other drug information is derived. These include journal publications on drug-related subjects, such as reports of clinical drug trials, case reports, and pharmacological research. The most reliable evidence comes from reports on randomized controlled trials. Proper evaluation of these trials requires considerable experience, and systematic reviews of combined trials may be necessary.

Advantage: up to date and best source of drug information.

Disadvantages: Costly and Time consuming.

### **Examples of Primary sources:**

1. Medical and therapeutics Journal:  
Annals of internal medicine, British Medical Journal, New England Journal of Medicine.
2. Pharmacy journals:
3. American Journal of Hospital Pharmacy, Annals of pharmacotherapy, Journal of Clinical and Hospital Pharmacy.
4. Drug and Toxicology Information and Pharmacology Journal;
5. British Journal of Clinical Pharmacology, Human and Experimental Toxicology.

### **Secondary literature:**

Secondary sources consist of reviews of primary reports. These provide a personal perspective of the literature and can include comments on how the author might apply the information in practice.

Disadvantages: Need to pay for access for most and don't always include full text

Examples are: Pub-Med, Medline, International Pharmaceutical Abstracts, DRUGDEX, Martindale, POISINDEX.

### **Tertiary literature:**

Tertiary literatures are the starting point to identify information as they provide complete overview on a specific topic. They summarize the primary and secondary published literature. Main examples are printed textbooks.

*Advantages:* Convenient, Easy to use, Familiar to most pharmacists.

*Disadvantages:* Older, less current information.

### **Examples of tertiary sources:**

Drug information handbook, Drug interactions Stockley, Handbook of injectables, Martindale, Pharmacopoeias, Physicians desk ref, BNF, USP, Australian formulary, Emdex.

## **2.6 Overview of Drug Information Needs and Seeking Behavior**

Understanding the drug information needs and information-seeking behavior of various healthcare professional is essential as it determines the planning, implementation and operation of information system and services (Avitgis et al., 2011). Literature reviews have revealed that health practitioners need timely, accurate, and up to date drug information that is obtained from reliable sources (Debra et al., 2007). Hence, the working facility and type of task done by healthcare professionals determines their information needs and pattern information use.

Health care professionals may be prompted to engage in seeking drug information in order to meet their needs Younger, (2010). However, drug information needs do not necessarily translate into information seeking behavior; several factors may determine how an individual respond to drug information need (Case, et al., 2005). Information needs are therefore a requirement that drives health professionals into an information seeking process to meet their information needs. Knowledge about

the information needs, information behavior and seeking patterns of health professionals is important to satisfy the information needs and improve the provided health care services.

Health professionals access different drug information sources to get information, but mostly depend on colleagues and medical textbooks or journals. For instance, studies from high-income countries revealed that physicians mostly seek information on limited number of clinical cases, about which they first consult colleagues and printed materials Davies, (2007). A multi-Centre survey, (China, Egypt, Kenya, India, Thailand) of hospital doctors clearly revealed textbooks remain the most commonly consulted source of information on the management of common medical conditions; journals were less popular and computer searching were uncommon (Hellers, et al., 2000). Another source revealed that health professionals used colleagues as their first source of information Younger, (2010).

Studies from low-income countries also revealed that colleagues remained the main source of medical information for health professionals in Uganda (Tumwikirize et al., 2009). Colleagues were mostly consulted due to their availability, affordability, and accessibility. With the development of technology, the practice has started to change overtime. Some recent studies revealed that Internet or electronic resources are the common sources of information for health professionals. In summary, most research shows that health professionals depend on colleagues for drug information (Tannery et al., 2007).

### **2.6.1 Factors affecting utilization of Drug Information service**

#### *Institutional Factors*

According to Cogdill, (2008), drug information need and seeking patterns of healthcare professionals depend on their roles in the healthcare delivery system. Certain factors affect which sources and types of information are used in a given situation. However, there are various barriers that limits health professionals drug seeking behavior. A study by (Tarapanoff et al., 2008) described these factors as personal, emotional, educational, demographic, social/interpersonal, environmental, economic, and source characteristics. The major barriers that limited health care professionals from seeking information in other high-income countries were related to lack of time, limited access to resources (Flynn, et al., 2011), inadequate search skills, cost, too much information, and liability issues Masters, (2008).

#### *Technological Factors*

A study by Davis, (2007) reviewed that the major barriers to information-seeking behavior included unreliability on internet sources, lack of time, inadequate search skills, lack of basic computer skills, and irrelevant materials Davies, (2007). Internet remains one of the most utilized sources to provide drug information. New communication technologies have been greatly used in every area of the healthcare delivery system in recent years, including electronic patient records, access to laboratory results using the Internet, text messaging reminders on dates, and the use of mobile device applications that allow you to have quick access to health information as well as to take a picture of your prescription and text it to your pharmacy for medication refill (Avtgis et al., 2011).

#### *Socio-Demographic Factors*

There are various barriers encountered by health professionals in an effort to meet their information needs which affect their information seeking behavior. These factors include personal, emotional, educational, demographic, and social or interpersonal. A study done by Gavgani, it found that people who are more educated than others use internet for seeking health information (Gavgani, et al., 2013). Another study done by (Bennett et al., 2009) showed that health professionals who are younger may be more likely to use electronic sources.

### **3. RESEARCH METHODOLOGY**

#### **3.1 Study Area**

Kaduna State is one of the 36 states of the Federal Republic of Nigeria located in the northwest geopolitical zone of the country. It takes its name from the capital Kaduna, hence it is usually referred to as Kaduna State to distinguish the two. It is ranked 4th by land area and 3rd by population in Nigeria. The population of the state according to 2006 census stands at 6,113,503. The total land mass of the State is estimated at 46,053 sq km which is about 5% of the total land area of Nigeria.

BDTH, Kaduna is a 240 bed capacity hospital located at Lafia Road, City centre, Kaduna North Local Government Area Kaduna State. ABUTH, is a 490 bed capacity hospital located in a town known as Shika along Zaria-Sokoto road in Zaria, Giwa Local Government Area of Kaduna State. BDTH has across its clinical department averagely 25 medical doctors, 103 nurses, 15 pharmacists, while ABUTH Zaria has 42 medical doctors, 122 nurses, 38 pharmacists.

#### **3.2 Study Design**

The research design used in this study was a cross-sectional descriptive design.

#### **3.3 Study population**

This study was carried out in two tertiary hospitals in Kaduna state (Barau Dikko Teaching Hospital (BDTH), Kaduna and Ahmadu Bello University Teaching Hospital (ABUTH), Zaria. Kaduna State.

##### *3.3.1 Inclusion Criteria*

All Doctors, Nurses and pharmacists available in both tertiary hospitals (BDTH and ABUTH) who were willing to participate were included in the study.

##### *3.3.2 Exclusion Criteria*

House officers and Interns of the above listed health professionals.

#### **3.4 Sample Size Determination**

The minimum sample size was determined by using the Taro Yamane Method (Formulated by Statistician, 1967).

$$n=N/(1+N(e)^2)$$

where n=sample size

N= population under study = 345

Note:

Average number of Pharmacists in BDTH and ABUTH is **53**.

Average number of Doctors and Nurses in BDTH and ABUTH is **292**.

e=margin error=0.05

$$n=345/1+345(0.05)^2 = 345/1+345(0.0025) = 345/1+0.9$$

n = 181.6 Respondents

To cater for non-response, 15% (27.2) of the sample respondents were included in the study. The non-response rate was due to the lack of time of healthcare professionals which had a negative effect on the availability of health professionals in the health facilities and non-response. Therefore, a total of 208 questionnaires were administered but 190 were returned.

*Attrition rate of 15%(27.2). Therefore  $181+27= 208$  (Sample size)*

*Sampling = Sample size / Entire population X Population of sub groups*

*Respondents A (PHARMACISTS) =  $208/345 \times 53 = 31$  Respondents*

*Respondents B (DOCTORS) =  $208/345 \times 67 = 40$  Respondents*

*Respondents C (NURSES) =  $208/345 \times 225 = 135$  Respondents*

### **3.5 Sampling Technique**

Convenience sampling technique was used for this study, the questionnaires were distributed on working days, and link to the online questionnaires were distributed through WhatsApp were respondents can log-in and respond.

### **3.6 Data Collection Instrument**

The study was conducted using the physical questionnaire and online questionnaire (Microsoft. forms. office). The Microsoft. Forms. Office is an E-survey tool, used to collect the data. The E-survey offers the following features: (i) allows the researcher to create a set of questions, (ii) makes the questions available to the study participants by sending them an email or sharing a URL and via WhatsApp and (iii) allows for viewing the responses to questions as and when they are answered showing the results in frequencies and percentages. The questionnaires were distributed during working days at both tertiary hospitals (BDTH and ABUTH)

### **3.7 Data Collection**

This was done by the researcher and 2 research assistants. The research assistants were Intern Pharmacists and a Nurse from ABUTH. They were trained on the study criteria and data collection.

### **3.8 Data Analysis**

All answered questionnaires were rechecked for completeness. Data was analyzed via descriptive statistics, using Statistical Package for Social Sciences (SPSS) version 20-software package and variables were presented by means of tables and charts showing results in frequencies and percentage.

### **3.9 Ethical Consideration**

Ethical Clearance was sought from the health research and ethics committee (HREC) of Barau Dikko Teaching Hospital Kaduna and the Ministry of Health Kaduna State. In addition, an informed consent was obtained from individual respondents.

## **4.0 RESULTS**

### **4.1 Results on Drug Information Services Provided by Pharmacists**

This section presents the findings of the study, based on research objectives. The results are presented as follows: socio-demographic characteristics, evaluation of drug information (DI) services and type of queries received from health professionals.

#### 4.2 Sociodemographic Characteristics of Respondents

Out of the 61 respondents, majority were females 35 (57%) were aged 19-28 years 40 (66%), single 43 (70%), Muslims 29 (48%). In relation to the qualifications, majority of the respondents 50 (82%) were B. Pharm holders. Lastly, in relation to their years of service, majority 42 (70%) had work experience within 1-5 years, followed by 11 (18%) with an experience within 6-10 years, and the smallest proportion of 5 (8%) and 2 (3%) with work experience of 11-15 and above 16 years respectively.

**Table 1.** Sociodemographic characteristics of respondents

Characteristics	Frequency (Percentage) N=35(%)	
Gender	Male	14(40)
	Female	21(60)
Age(Years)	19-28	12(34)
	29-38	16(46)
	39-48	5(14)
	>49	2(6)
Marital Status	Married	15(43)
	Single	18(51)
	Divorced	2(6)
Religion	Christianity	15(43)
	Islam	20(57)
Qualification	B. Pharm	23(66)
	Pharm. D	1(3)
	Msc Pharm	11(31)
Years In Service	1-5	12(35)
	6-10	12(35)
	11-15	8(24)
	>16	2(6)

#### 4.3 Mode of drug information Requests

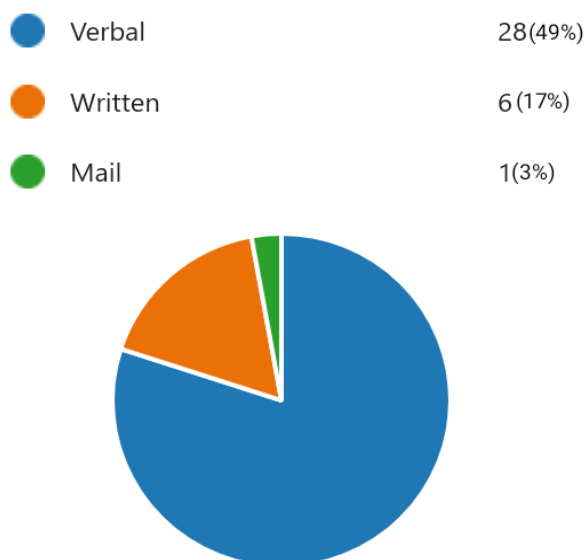
The main mode of request of dug information is by direct access to the pharmacist 28 (44%), followed by phone calls 22(34%)

**Table 2.** Mode of drug information request of the respondents

Response Variables	Frequency (Percentage) N=35
Direct access	28(44)
Ward rounds	11(17)
Query box	3(5)
Phone calls	22(34)

#### 4.4 Common mode of drug information (DI) responses

This analysis revealed most pharmacists 28(80%) provide or respond to drug queries via verbal responses, followed by written form 6(17%) and mail 1(3%).



**Figure 1.** Common mode of DI responses of the respondents

#### 4.5 Average time of responses

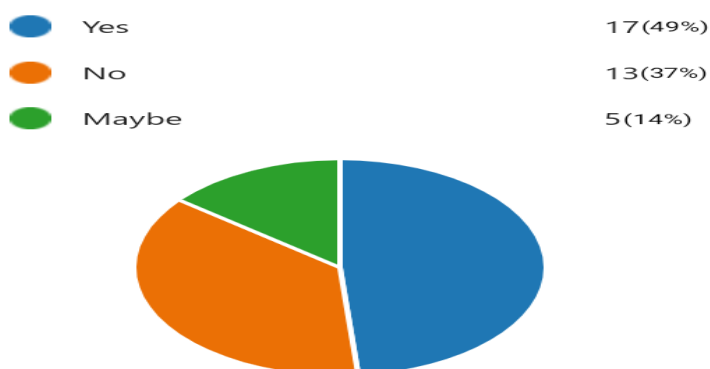
This table summarizes the average time of response, with most pharmacists 20(57%) responding to DI queries within minutes, some provide information immediately 12(34%), within hours 3(9%).

**Table 3.** Average time of responses of the respondents

Response Variables	Frequency (Percentage) N=35(%)
Immediately	12(34)
Minutes	20(57)
Hours	3(9)

#### 4.6 Documentation of received enquiries by pharmacists.

The analysis of documentation of received enquiries showed that most pharmacists 17(49%) document received enquiries, slightly lesser number of pharmacists 13(37%) do not document received enquiries and 5(14%) are not certain of documentation.



**Figure 2.** Documentation of received enquiries by pharmacists

#### 4.7 Forms of feedbacks received from enquirers

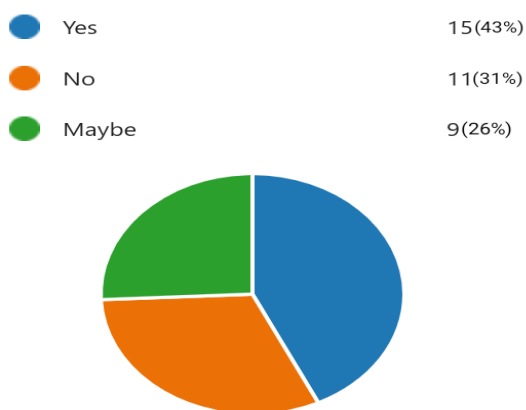
This table shows the feedback or remarks of provided drug information (DI) by the pharmacist, which revealed that enquirers are generally satisfied with obtained DI, with mostly 18(51%) satisfactory remark, with a 0% need for improvement.

**Table 4.** Forms of feedbacks received from enquirers

Response Variable	Frequency (Percentage) N=35(%)
Satisfactory	18(51)
Excellent	10(29)
Good	7(20)

#### 4.8 Provision of educational programs for health professionals

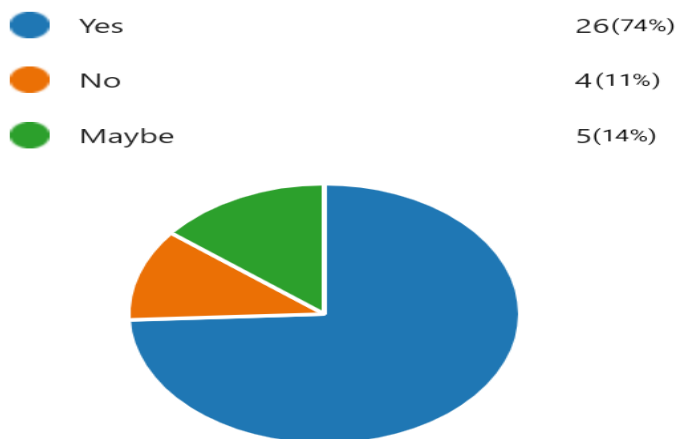
This chart summarizes the pharmacist provision of educational programs for health professionals, revealing that 15(43%) of pharmacists provide this education, while 9(26%) of pharmacists are not sure if they provided this education.



**Figure 3.** Provision of educational programs for health professionals

#### 4.9 Participation in patient educational programs.

This chart reveals the analysis of pharmacists ensuring patient educational programs, with most 26(74%) pharmacists participating in the program, while 4(11%) do provide patient education.



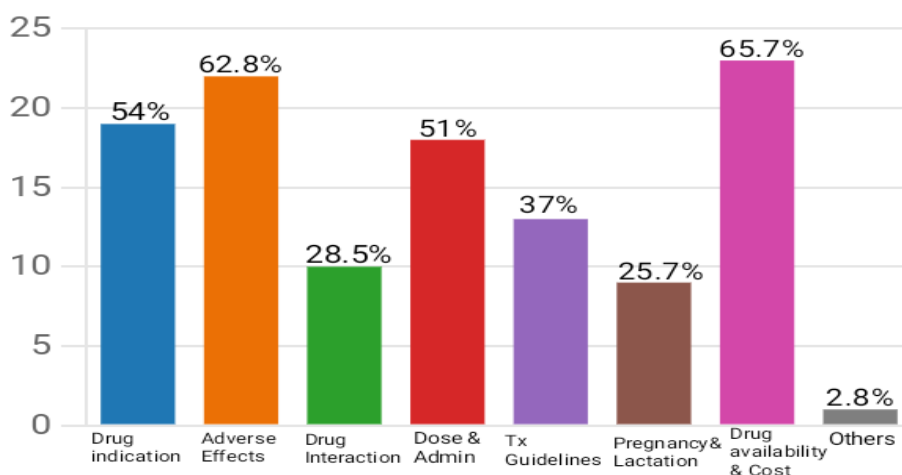
**Figure 4.** Participation in patient educational programs

#### 4.10 Types of Queries Received from Health Professionals

This section explains the results, involving the common queries, status of enquirer, sources of the provided information and frequency of source visit.

##### 4.10.1 Common Drug Information (DI) queries received

This chart reveals the type of queries asked, which shows that the most enquired drug information 23(65.5%) is drug availability and cost, 22(50.8%) adverse effects, 19(36%) drug indication.



**Figure 5.** Common DI queries received: *TX= Treatment*

##### 4.10.2 Status of drug information (DI) enquirer

This chart shows the status of the DI enquirer, with the most 26(32%) being the patients.

**Table 5.** Status of DI enquirer

Response Variables	Frequency (Percentage) N=35(%)
Physicians	18(22)
Pharmacists	15(19)
Nurses	17(21)
Patients	26(32)
Others	5(6)

##### 4.10.3 Common sources of drug information (DI) used by pharmacists

This summarizes the DI sources, most pharmacist 28(83.6%) consult EMDEX/Micromedex, followed by 19 (50.8%) BNF, while BP 1(6.5%) was the least consulted source.

## 5. RESULTS ON DRUG INFORMATION SEEKING BEHAVIOUR AMONG HEALTH CARE PROFESSIONALS (HCPs)

### 5.1 Socio Demographic Characteristics of Respondents

Out of the 155 respondents, majority were males 81(52%), aged 19-28 years 75(49%), mostly single 76(62%) and Christians 101(66%). Most of the respondents 104(64%) were Nurses, and then 44(36%) Doctors, most working in both the in and out patient unit 130(88%), with an access to computer 103(68%) and a working duration within 1-5 years 81(54%).

**Table 6.** Common sources of DI used by Pharmacists

Response Variables	Frequency(Percentage) N=35(%)
EMDEX/Micromedex	28(80)
Martindale	12(34)
BNF	19(54)
BPC	4(11)
Drug leaflets	14(40)
Textbooks	6(17)
Nigerian national drug formulary	11(31)
Meyers side effects on drugs	2(5.7)
Lexicoms drug information handbook	4(11)
BP	1(2.8)

**Table 7.** Socio demographic characteristics of respondents

Characteristics		Frequency (Percentage) N=155
Gender	Male	81(52)
	Female	74(48)
Age(Years)	19-28	75(49)
	29-38	26(16)
	39-48	38(24)
	>49	16(10)
Marital Status	Single	76(62)
	Married	58(38)
	Divorced	6(4)
	Widowed	14(9)
Religion	Christianity	101(66)
	Islam	54(34)
Qualification	Doctors	44(36)
	Nurses	104(64)
Working Unit	In-Patients	11(7)
	Out-Patients	6(4)
	Both	130(88)
Working Experience	Computer Access	103(68)
	No Computer Access	48(32)
Duration Of Practice (Years)	1-5	81(54)
	6-10	19(13)
	11-15	33(22)
	>16	17(11)

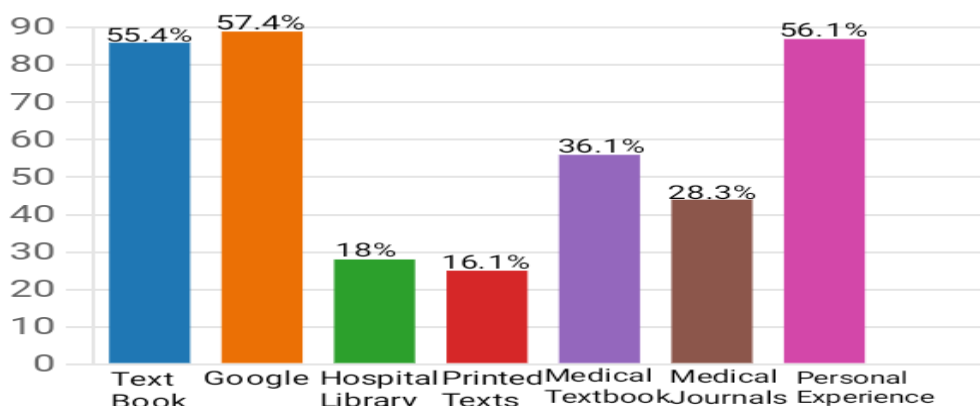
## 5.2 Information Seeking Pattern

This section explains the common drug information (DI) sources, frequency of utilizing these sources, the HCPs they consult and frequency, the purpose of DI needs, type of DI needs, form at which this information are shared amongst healthcare professionals (HCPs), documentation of DI, barriers observed when seeking DI and the possible recommendation to overcome the mentioned barriers.

## 5.3 Common drug information sources used by other healthcare professionals (HCPs)

The chart shows the results obtained from the study concerning the common drug information (DI) sources utilized by HCPs in Kaduna State. Most HCPs depend on Google 89(57.4%), personal

experience 87(56.1%) the most in providing healthcare services and rarely utilizes 25(16.1%) printed texts.



**Figure 4.** Common DI sources used by other HCPs

#### 5.4 Frequency of consulting drug information sources

This result reveals the frequency at which HCPs consult these sources. Most HCPs uses these sources on a daily basis 78(51%), while some only consult these sources when necessary 34(22%), weekly 24(16%) and monthly 8(5%).

**Table 8.** Frequency of consulting drug information sources

Response variable	Frequency (Percentage) N=155(%)
Daily	78(51)
Weekly	24(16)
Monthly	8(5)
When necessary	34(22)
Other	9(6)

#### 5.5 Health care professionals (HCPs) consulted for drug information

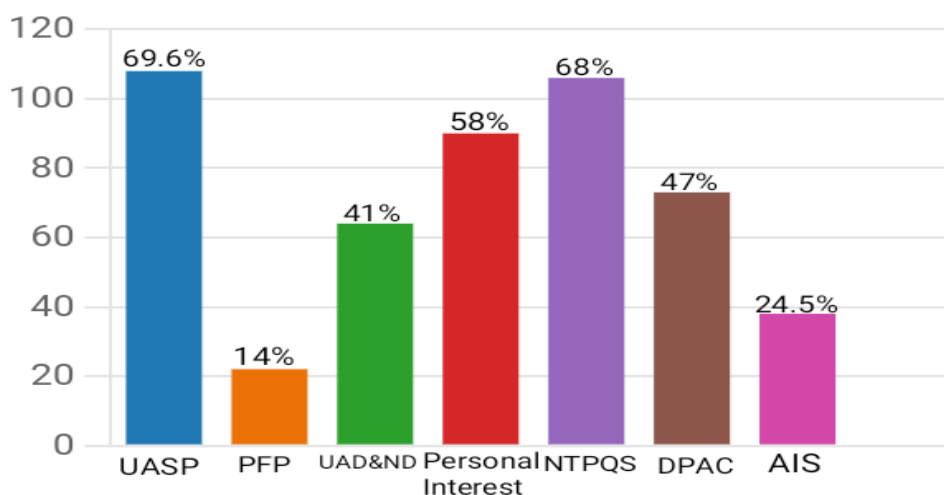
This analysis reveals that most HCPs seek drug information (DI) from pharmacists 62(41%), while others consult all the above listed HCPs 44(29%), Physicians 32(21%) are also consulted for DI, while the least consulted are the nurses 14(9%).

#### 5.6 Reasons for drug information (DI) sought

This chart shows the purpose at which healthcare professionals (HCPs) seek DI. Most HCPs 108(69.6%) seek drug information for update on knowledge about a specific patient for optimum care, followed by 106(68%) who seek DI for the need to provide quality healthcare services. The least reason 22(14%) was preparation for publication.

**Table 9.** HCPs consulted for drug information

Response variable	Frequency(Percentage) N=155(%)
Physician	32(21)
Pharmacist	62(41)
Nurses	14(9)
All the above	44(29)
Other	1(1)



**Figure 5.** Reasons for DI sought

UASP= Update about specific patient, PFP= Preparation for publication, UAD&ND= Update about disease and new drug, NTPQS= Need to provide quality service, DPAC= Disease prevention and control, AIS= Adequate information searching.

**5.7 Common drug information (DI) sought**

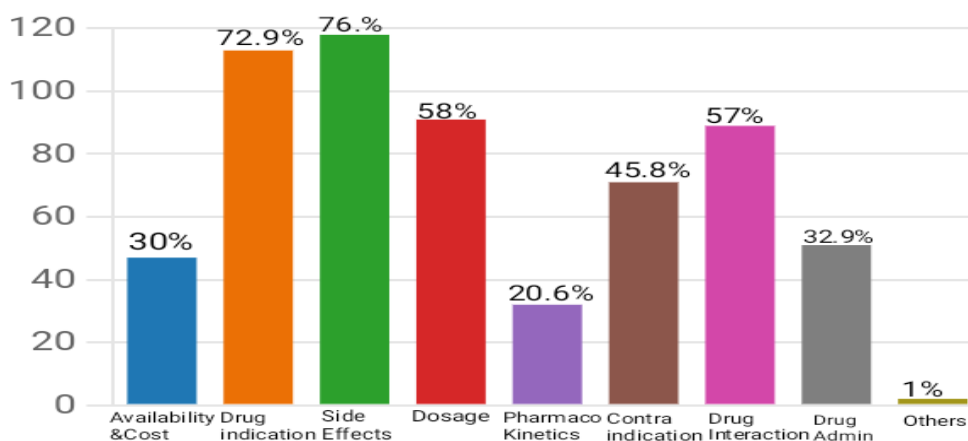
This reveals the analysis on the common DI needs by HCPs in Kaduna State. Most DI sought were about side effects 118(76%) and drug indication 113(72.9%). While the least were about 32(20.6%) pharmacokinetics and 2(1%) other related DI

**5.8 Channel of communicating drug information (DI)**

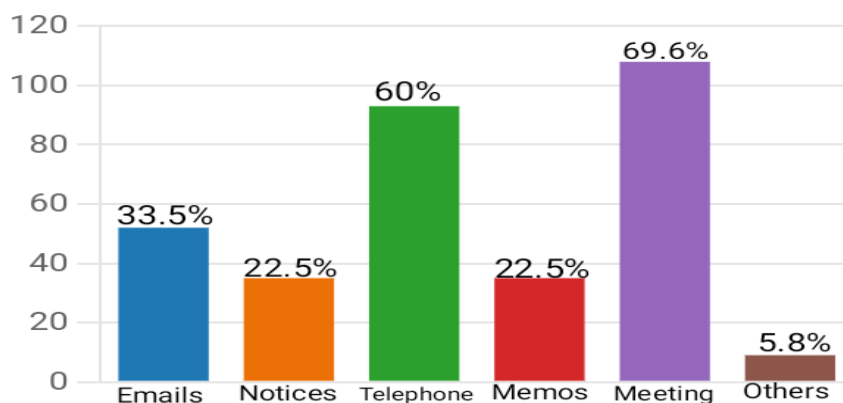
These results interpret the channels utilized in sharing DI in HCPs in Kaduna State which will be expressed in a descending order, from meeting/contact 110(69.6%), telephones 95(60%), emails 54(33.5%), notices 35(22.5%), memos 37(22.5%) and via other means 9(5.8%).

**5.9 Documentation of received drug information**

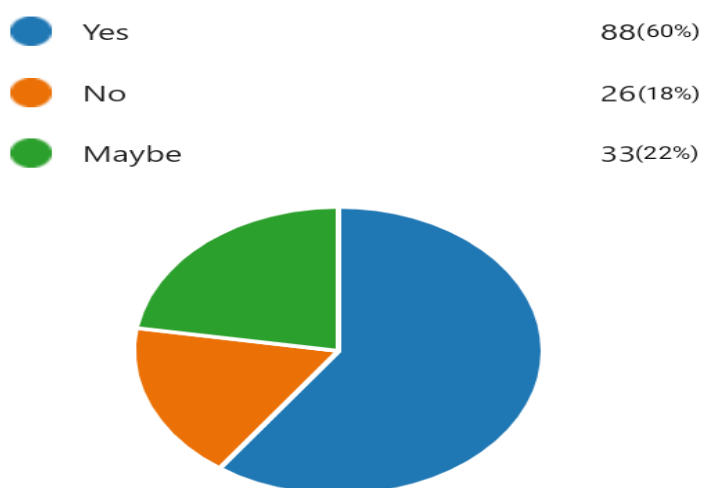
This section reveals if HCPs document received DI for further consumption, with most of HCPs 88(60%) appeared to keep/document received DI for continuity of use, and some appeared to be unsure 33(22%) of documentation, then 26(18%) of HCPs do not keep records of received DI.



**Figure 6.** Common DI sought



**Figure 7.** Channel of communication DI

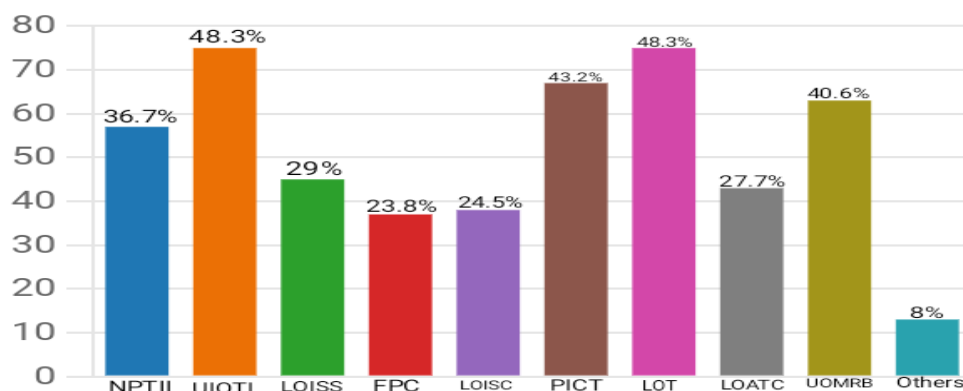


**Figure 8.** Documentation of received DI

### 5.10 Common barriers of seeking drug information (DI)

This obtained results identifies the most possible barrier of seeking DI by HCPs in Kaduna State. The most common barriers are lack of time (48%), Unreliable information on the internet (48%), and poor ICT infrastructure 43.2%. The least barriers were lack of information sharing culture (24.5%) and frequent power cut (23.8%).

NPTII= Negative perception towards internet information, UIOTI= Unreliable information on the internet, LOISS= Lack of information searching skill, FPC= Frequent power cut, LOISC= Lack of information sharing culture, PICT= Poor ICT infrastructure, LOT= Lack of time, LOATC= Lack of access to a computer, UOMRB= Unavailability of medical reference book.



**Figure 9.** Common barriers of seeking DI

### 5.11 Common recommendations to overcome these barriers

**Table 10.** Recommendations to overcome barriers of seeking drug information

Barriers	Recommendations
Lack of information sharing culture	Encourage information sharing culture Good rapport with colleagues
Unavailability of medical reference book Poor ICT Infrastructure	Increase the availability of medical reference books Good ICT Infrastructure and adequate number of qualified pharmacists Constant availability of internet network (WiFi)
Frequent power cut	Provision of adequate power supply Increase access to computer
Others	Equip hospital library
Others	Financial allocation to the hospital to upgrade drug information service
Others	We should not work in isolation...it should be a collaborative effort
Lack of time Unreliable information on the internet	Proper time management Hospitals should have a running drug information center
Lack of access to computer	Provide computers for easy access to drug information, and proper documentation of information

## 6. DISCUSSION

Drug information services is a complex process that integrates variable sources of drug information and expressing this information. Due to the high rate of increase in the need for essential healthcare and drug information needs, it has become necessary for pharmacists to stay abreast on the latest findings in the drug world (Langat Milton, 2012).

Responses from Pharmacists revealed that patients (32%) maximally utilizes the drug information services in comparison to other enquirers. This finding is in contrast to a study conducted in Saudi Arabia by (Abdullah et al., 2017) whose findings showed that physicians were the major users of drug

information services. This is possibly due to Pharmacists high involvement in ward rounds along-side Physicians and other health professionals.

This study also indicated that most pharmacists are consulted via direct access (44%) for drug information queries, which appeared to be one of the fastest and easiest ways of obtaining drug information, and this is possibly due to good Patient-Pharmacist communication. This result matches the findings done in South India by (Kandavalli et al., 2017), which revealed that (38.8%) of queries were received by direct access to the Pharmacist.

Most pharmacists (80%) appeared to provide drug information responses verbally, rather than in a written form (17%), with an average response time within minutes (57%). This observed result appeared to be in contrast to the study conducted in Bengal by (Jayasutha et al., 2011) which revealed that majority of queries were responded to within a day (86%). These differences could be as a result of previous experiences, documentation of past received queries and consistent improvement of drug knowledge. Despite providing drug information majorly within minutes, most pharmacists got a feedback response of providing a satisfactory (51%) drug information, which appears to be in contrast to the study done by (Walli et al., 2015), whose findings showed that majority of enquirers rated the provided drug information as good (90%), rather than satisfactory. This explains the exposure of some pharmacists to research and frequent access to reliable information sources in order to optimize healthcare services.

In determining the common queries received by pharmacists, this study revealed that most drug information sought were about (65.5%) drug availability and cost, followed by (50.8%) drug adverse effects and (36%) drug indication, which is attributed to both patients and physicians being concerned on the safety, tolerability and possible alternatives of drug in question they are either consuming or prescribing. This finding appeared to be closely related to a study done in Germany by (Marcel et al., 2011) which showed that the highest drug information sought were on (16%) adverse drug reaction. Another study by (Subash et al., 2013) showed that the most common queries were about drug indication/therapy (34%).

According to categorization of the common drug information sources, the most consulted source by pharmacists were (83.6%) EMDEX/Micromedex (Computerized information database), BNF (32%) and drug leaflet (39.3%). This might be because of ready availability of the sources and its ease of use as reference source in comparison to all other sources. This result matches the findings of (Vishwanath et al., 2020), whose results revealed that the highest consulted drug information source was EMDEX/Micromedex.

Furthermore, most pharmacists (49%) document received enquiries, which is crucial for pharmacists to easily access drug information when needed in the future. Most Pharmacists, (43%) provide educational programs for health professionals, and also (74%) participate in patient educational programs, possibly because patients were the most enquirers of drug information.

Regarding information seeking behavior among healthcare professionals aside pharmacists, this study indicated that all study participants had information needs, which concurred with (Pakenham-Walsh and Bukachi, 2009) who argued that information is essential in the healthcare system, especially in delivery of assigned roles and responsibilities.

Amongst all healthcare professionals, pharmacists, (41%) were consulted the most for drug information, possibly due to their known excellent drug knowledge. Although, some of these healthcare professionals rely on electronic sources/google (57.4%), personal experience (56.1%) and

textbook (54%) as sources for drug information. This shows similarity to a study done in Nigeria by (Mandu et al., 2020) where most respondents agreed to utilize electronic sources/google and textbooks as their source of drug information. A possible reason could be due to technological advancement and the ease of using this source, which relates to the socio demographic characteristics of the respondents within the age group of 19-28 years (48%) who were more exposed to the use of handheld devices than the older ones. Another finding to support this notion was done in Birmingham by (Bennett et al., 2009), which revealed that health professionals who were younger maybe more likely to use electronic sources when seeking drug information.

In regards to the common drug information sought, side effects (76%) and drug indication (72.9%) were the predominant drug information sought. This is possibly due to the importance of this drug knowledge in patient care, where error in drug use and high toxicity are considered life threatening. This result closely matches the finding in the study done by (Peter et al., 2017), where (21%) and (16%) were also on side effects and drug indication respectively.

The common reasons for drug information sought by respondents were mostly (69.6%) update on knowledge about patient and (68%) on the need to provide quality services. This is attributed to the passion and desire of healthcare professionals to provide good healthcare services and perform their duties accurately to prevent errors. This result is comparable with that of (Jeevangi et al., 2012) which showed (46%) and (15%) respectively.

Sharing of available and accurate drug information in a timely manner encourages health professionals to seek and communicate drug information to colleagues to keep each other updated. According to this study, the most utilized channel (69.6%) for sharing/communicating drug information is by meeting/contact, which appeared to be in line with a study done in Kenya by (Langat Milton, 2012) which showed (35.2%) due to urgent need of drug information in question.

Lack of time (48.3%) and Unreliable information on the internet (48.3%), has greatly affected and pose barriers towards seeking drug information according to this study. A probable reason for these barriers may be due to limited number of staff resulting to high patient ratio to the staff and the internet being a platform where anyone can upload information and the validity not certain. This result appeared to be in contrast to a study conducted in Nigeria by (Mandu A et al., 2020), where the predominant challenges faced in seeking drug information were unsteady power supply (89%), inadequate information in the library (80%), and (80%) poor information sharing culture among colleagues.

## **7. CONCLUSION**

Lack of appropriate drug information is one of the main cause of irrational drug use, leading to potential drug problems, therapeutic failure and adverse drug reaction. But, the enhanced utilization of drug information services is an effective and essential tool for better patient care. This study revealed that pharmacists provided a satisfactory and quality drug information services, utilizing Emdex/Micromedex as their source for drug information, which can be considered a reliable source of drug information.

The combination of drug information needs and the sources consulted makes up information seeking behavior. This study showed that other healthcare professionals (HCPs) possess an average seeking behavior as they rely on google, personal experience and pharmacists for their drug information. The common drug information sought were on drug side effects and indication. Although, certain factors such as unreliable information on the internet and lack of time appeared to be the major barriers of seeking drug information by other HCPs.

Therefore, it can be concluded that quality drug information services are being provided by Pharmacists in Kaduna State. Although, other HCPs possess an average drug information seeking behavior. But, adequate availability of reliable information sources, and easy accessibility would motivate good drug information services and seeking behavior among healthcare professionals in Kaduna State.

## **8. RECOMMENDATIONS**

1. Healthcare professionals, especially Pharmacists should always stay updated on drug information, especially that information concerning drug indication and adverse drug effects.
2. Patients should be well educated about their medications.
3. Rather than relying on internet for drug information, healthcare professionals should consult authorized reference materials or books for their drug information.
4. Healthcare professionals should imbibe drug information sharing culture.
5. Set up a constant running drug information centers in all hospitals.
6. There is a need to frequently carry out research to access drug information services of pharmacists as well as the seeking behavior of other healthcare professionals due to rapid increase and availability of drug options over time.

## **Acknowledgement**

*The authors wish to acknowledge the funds provided for this research and publication by TETFund Centre of Excellence for Renewable Energy, Kaduna Polytechnic, Kaduna, Nigeria. The funds were provided by the Tertiary Education Trust Fund (TETFUND), Nigeria, under the TETFUND Special Intervention for Establishment of Centre of Excellence (TETF/ES/DS&D/KADPOLY/COE /2021/VOL11).*

## **Conflicts of Interest**

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

## **References**

- Andrews J. & Pearce K. (2005). Information-seeking behaviors of practitioners in primary care practice-based research network (PBRN). *J Med. Libr. Assoc*, 93:2.
- Ann Varsha Peter, Anusha Murali, Tilu Tomy, Sushilkumar P Londhe. (2017). Assessment and Utilization of Drug Information Services and Creating Awareness for Enhanced Utilization of Drug Information Center in a Tertiary Care Teaching Hospital, *Journal of Pharmaceutical and Clinical Research*,10(5), 270-274.
- ASHP Guidelines on the Pharmacist's Role in Providing Drug Information. Available from: <http://www.ashp.org/doclibrary/bestpractices/specifcigdmedinfo.aspx>.
- Avtgis T., Polack E., Staggers S., &Wieczorek S. (2011). Ethical guideline for the use of electronic mail between patients and physicians. *American journal of Bioethics*, 3:84
- Beena G, Rao PG. (2005) Assessment and evaluation of drug information services provided in a South Indian teaching hospital. *Indian J Pharmacol*;37(5):315-18.
- Bennett N., Casebeer L., Zheng S.&Kristofco R. (2009). Information-seeking behaviors and reflective practice. *J.Contin. Educ Health Prof. Spring*, 26(2):120127.
- Case D., Andrews J., Johnson J & Allard S. (2005). Avoiding versus seeking: the relationship of information seeking to avoidance, blunting, coping, dissonance, and related concepts. *Journal of the Medical Library Association*, 93(3):353.
- Cogdill K (2008). Information needs and information seeking in primary care: a study of nurse practitioners. *J. Med. Libr. Assoc.*, 91(2):203-215.

- Davies K. (2007). The information-seeking behaviour of doctors: a review of the evidence. *Health Information and Libraries Journal*, 24:78-94.
- Debra.R. & Anne.M, (2007). Understanding the information needs of public health practitioners: A literature review to inform design of an interactive digital knowledge management system. *Journal of Biomedical informatics*, 40:410-421.
- Kandavalli Sridevi, M. Venkata Subbaiah, M. Surekha, J. Harini, S. Chandini, S. Basher, S. Veeraseshkar. (2017). Clinical Pharmacist Role in Drug Information Services And Medication Errors Management At Tertiary Care Hospital. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 16, Issue 6 Ver. XI, PP 16-23.
- Flynn M. & McGuinness C. (2011). Hospital clinicians' information behaviour and attitudes towards the "Clinical Informationist": an Irish survey. *Health Information and Libraries Journal*, 28(1): 23-32.
- Gavani V., Qeisari E. & Mohammed J. (2013). Health Information Seeking Behaviour: A study of a Developing Country. *Library Philosophy and practice*, 902Iyer RS, Rekha M, Kumar TS, Sarma PS, Radhakrishnan K. (2011). Primary care doctors management behavior with respect to epilepsy in Kerala, Southern India. *Epilepsy Behav*; 21:137-42 Jayasutha J, Ashok KM, Sreeram S, Monic JN. (2011). Statistical survey and evaluation of drug information services at a tertiary care hospital. *Res J Pharm Biol Chem Sci*; 2(3):249-53.
- Jeevangi Vishwanath M, Neelkantreddy P, Anand BG, Hinchageri SS, Manjunath G, Shantveer H. (2012) Assessment and evaluation of drug information service provided by pharmacy practice department based on enquirers perspective. *Int Res J Pharm*; 3(10):193-9.
- Kalra MA, Pakhale SP, Khatak B, Khatak S. (2011). Drug information centers-Need of the hour. *Int Pharm. Sci.*; 1:69-76.
- Langat Kipkoeh Milton. Information Seeking Behavior Among Health Professionals in Public Health Facilities in Garissa county, Kenya. (2012). *Journal of Health Information in developing Countries*, 13:6, 45-56.
- Malone PM, Mosdell KW, Kier KL. Drug information. (2001), *A Guide For Pharmacists*. 2nd ed. Mc Graw Companies. p. 1-18.
- Mandu A. March, Hannah A. Vackosen and Enye A. Akporoghene (2020). Information Needs and Seeking Behavior of Nurses at River State University Teaching Hospital, Port-Harcourt. Information impact: *Journal of information and knowledge management*, 11:3, 63-74.
- Marcel KP Kusch, Walter E Haefeli, and Hanna M Seidling. (2018). How to meet patients individual needs for drug information. *Patients prefer adherence* 12:2339-2355.
- Masters K. (2008). For what purpose and reasons do doctors use the Internet: a systematic review. *International Journal of Medical Informatics* 77(1):4-16.
- Miranda S. & Tarapanoff K. (2008). Information needs and information competencies: a case study of the off-site supervision of financial institutions in Brazil. *Information Research*, 13:2.
- Mohamed A. (2011). *Information needs and information seeking behaviour of Libyan doctors working in Libyan hospitals [A Doctoral Thesis]*. Libya: Loughborough University
- Mudigubba MK, Sowmya B, Dinesh R, Karthik M, Alpesh KN, Yoganada R. (2013). Evaluation of performance of drug information centre providing quality of information services to health care professionals in a tertiary care teaching hospital of south India. *Innov Pharm Pharmacother*; 1(2):81-90.
- Nahla HK, Ming MW, Heba A, Ahmed A, Yasmin HE. (2016). Quality evaluation and survey of the essential need for drug information centers. *Int J Pharm Pharm Sci*; 8(11):137-43.
- P. Mishra, Chhetri, A.K., S. Palaian, (2008). Drug Information Services in Nepal; The changing perspectives. *Kathmandu Univ. Med. J.*, 6:117-121
- Page.J. & Hellers R. (2000). Where do developing world clinicians obtain evidence for practice: a case study on pneumonia? *J clin. Epidemiol*, 53(7):669-75

- Paken-Walsh N. & Bukachi F. (2009). Information needs of health workers in developing countries: A Literature review with focus on Africa. *Human Resources for Health*, 78(7):41-47
- Rajanandh MG, Ruby V, Ramasamy C. (2011). Assessment of drug information services in a south Indian tertiary care hospital in Kanchipuram district. *Int. J. Pharm. Sci*;3(3):273-6.
- Rothschild JM, Lee TH, Bae T, Bates DW. (2002). Clinician use of a Palmtop Drug Reference Guide. *J. Am. Med. Inform. Assoc.* May-June; 9(3): 223-9.
- Sawsan Abdullah Alamri ,Raniah Ali Al Jaizani , Atta Abbas Naqvi and Mastour Safer Al Ghamdi. (2017). Assessment of Drug Information Service in Public and Private Sector Tertiary Care Hospitals in the Eastern Province of Saudi Arabia. *Pharmacy*, 5, 37; doi:10.3390/pharmacy5030037 [www.mdpi.com/journal/pharmacy](http://www.mdpi.com/journal/pharmacy).
- Shah A., Naqvi A.A., Ahmad R. (2016). The need for providing pharmaceutical care in geriatrics: A case study of diagnostic errors leading to medication-related problems in a patient treatment plan. *Arch. Pharm. Pract.*;87-94.
- Subash VK, Vijayalaxmi C, Alekhya P. (2013). Performance of drug information centre by a clinical pharmacist in a tertiary care teaching hospital, Warangal, Andhra Pradesh, India. *Int. J. Pharm. Pract Drug Res.*; 3(1):1-5.
- Tahamtan, I., TavassoliFarahi, M., Afshar, A.S. and Baradaran, H.R. (2015). Drug information seeking behaviors of health care professionals in Iran, New Library World, Vol. 116 No. ¾, pp. 173-186.
- Tannery N., Wessel C., Epstein B. & Gadd C. (2007) Hospital nurses' use of knowledge-based information resources. *Nursing Outlook*, 55(1):15-19.
- Tumwikirize W., Ogwal-Okeng, J., Vernby A., Anokbonggo W., Gustafsson L. & Lundborg C. (2009). Access and use of medicines information sources by physicians in public hospitals in Uganda: a cross-sectional survey. *African Health Sciences*, 8(4):220–226.
- Walli M, Samreen A, Satheesh M, Ramya NG, Saradha S, Uma MR. (2015). Drug information service: A valuable service for better patient care provided by clinical pharmacists in government hospital. *World J. Pharm. Res.*; 4(3):1552-60.
- Younger P., Walsh N. & Bukachi F (2009). Information needs of health care workers in developing countries: a literature review with a focus on Africa. *Human Resources Health*,7:30.

